REMARKS

Claims 1-6, 8-11, 13-15, 17-42 are currently pending in the subject application and are presently under consideration. Claims 1, 10, 14, 15, 17, 19, 21, 23, 34, 39 have been currently amended while claims 7, 12 and 16 have been canceled as shown at pages 2-8 of the Reply. New claims 41 and 42 are added. Support for these claim can be found in the specification as filed at page 9 lines 1-6.

Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

I. Objection of Claim 17

Claim 17 is objected to because of minor informalities. Withdrawal of this objection is requested in view of the aforementioned amendment to this claim.

II. Rejection of Claim 36 Under 35 U.S.C §112

Claim 36 stands rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Withdrawal of this rejection is requested in view of the aforementioned amendment to this claim.

III. Rejection of Claims 1-40 Under 35 U.S.C. §101

Claims 1-40 stand rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter. Withdrawal of this rejection is requested in view of at least the following. The subject claims recite statutory subject matter that produces a useful, concrete and tangible result. Independent claims 1, 10, 21 and 34 pertain to query optimization for database systems wherein extra predicates are introduced into an original query. These predicates are used as dictated by rules and are tied to index utilization. Hence, the claims recite systems with computer-executable components stored in a computer memory which produce concrete, tangible results of adding predicates to original queries which are utilized in increasing efficiency of execution of the original query. Similarly claim 21 recites a computer readable medium with instructions that produce similar results. Therefore, it pertains to a computer-readable medium encoded with a computer program which is a computer element that defines

structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See *Lowry*, 32 F.3d at 1583-84, 32 USPQ2d at 1035. In view of at least the foregoing, it is clear withdrawal of this rejection is respectfully requested.

IV. Rejection of Claims 1, 6 and 9 Under 35 U.S.C. §102(b)

Claims 1, 6 and 9 stand rejected under 35 U.S.C. §102(b) as being anticipated by Levy, *et al.* (U.S. 6,088,524). This rejection should be withdrawn for at least the following reasons. Levy, *et al.* does not disclose or suggest all elements of as set forth in the subject claims.

> A single prior art reference anticipates a patent claim only if it ***expressly or inherently describes each and every limitation set forth in the patent claim***. *Trintec Industries, Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 63 USPQ2d 1597 (Fed. Cir. 2002); *See Verdegaal Bros. v. Union Oil Co. of California,* 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The ***identical invention must be shown in as complete detail as is contained in the ... claim***. *Richardson v. Suzuki Motor Co.,* 868 F.2d 1226, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989) (emphasis added).

The claimed subject matter generally relates to a query optimization wherein a predicate component that introduces into a query an extra predicate that is used as dictated by rules and is tied to index utilization. To this end, independent claim 1 recites: ***the implied predicate is selected from the one or more implied predicates based at least on a determination of the predicate being used in index-seek operation or covered by contents of the one or more indices.*** Levy, *et al.* does not teach or suggest such claimed aspects.

Levy, *et al.* relates to a method for manipulating aggregation predicates in database applications. New predicates are inferred from an initial set of predicates including the aggregation predicates in representative form. Although Levy, *et al.* teaches optimization strategies involving Extensible/Rule Based Query Rewrite Optimization in Starburst optimizer, or the predicate move-around algorithm, it does not teach or suggest selecting an implied predicate based on a determination of the predicate being used in an index-seek operation or covered by contents of an index.

In contrast, the claimed subject matter provides for efficient execution of queries by

including into the original queries, predicates that exploit one or more indices. Accordingly, an initial query is broken up into conjuncts which are analyzed to determine whether they can be used as part of an index-lookup operation. Finally, all indices are analyzed and, for each index, lists the conjuncts that could be used in index-seek operations, or that are covered by the contents of an index. Upon finding the index-solution that involves a certain set of indices, index expressions are generated for each of the indices and are employed for optimizing the query (*See* applicants' specification page 12 lines 3-10).

In view of at least the foregoing, it is clear that an identical invention as recited in independent claim 1 is not taught or suggested by the cited reference. Therefore, withdrawal of this rejection is requested with respect to independent claim 1 and all the claims that depend there from.

V. Rejection of Claim 2 Under 35 U.S.C. §103(a)

Claim 2 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, *et al.* as applied to claim 1, in view of Larson, *et al.* (U.S. 6,381,616) hereafter, "Larson '616". It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claim 2 depends on independent claim 1. As stated *supra*, Levy, *et al.* does not teach or suggest all features of claim 1. Larson'616 relates to modifying or converting predicates involving a comparison with a string constant in a query so that the predicates can be evaluated by an external or remote source that uses a different collating sequence. But it does not makeup for the aforementioned deficiency of Levy, *et al.* with respect to independent claim 1. Therefore, withdrawal of this rejection is requested with respect to dependent claim 2.

VI. Rejection of Claims 3-5 and 7 Under 35 U.S.C. §103(a)

Claims 3-5 and 7 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, as applied to claim 1, in view of Larson, *et al.* (U.S. 20030093415) hereafter, "Larson '415". It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claims 3-5 and 7 depend on independent claim 1. As stated *supra*, Levy, *et al.* does not teach or suggest all features of claim 1. Larson'415 relates a transformation-based optimizer that generates rewritings by applying local algebraic transformation rules on subexpressions of the query. Application of a transformation rule produces substitute expressions that are logically equivalent to the original expression. In particular, a view matching rule (or rules) is disclosed, which determines whether the original query can be computed from one or more of the existing materialized views and, if so, generates substitute expressions. An index structure, called a filter tree, is provided that speeds up the search for applicable materialized views. However, nowhere does Larson'415 teach or suggest increasing efficiency of query by adding predicates ***based at least on a determination of the predicate being used in index-seek operation or covered by contents of the one or more indices*** as recited in independent claim 1. Therefore, it does not makeup for the aforementioned deficiency of Levy, *et al.* with respect to independent claim 1. Hence, withdrawal of this rejection is requested with respect to dependent claims 3-5 and 7.

VII. Rejection of Claim 8 Under 35 U.S.C. §103(a)

Claim 8 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, *et al.* as applied to claim 1, in view of Dessloch, *et al.* (U.S. 6,338,056). It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claim 8 depends on independent claim 1. As stated *supra*, Levy, *et al.* does not teach or suggest all features of claim 1. Dessloch, *et al.* relates to indexing semi-structured, non-traditional data using an external search engine accessible to a database engine through a standardized interface. But it does not makeup for the aforementioned deficiency of Levy, *et al.* with respect to independent claim 1. Therefore, withdrawal of this rejection is requested with respect to dependent claim 8.

VIII. Rejection of Claims 10-15 and 17-18 Under 35 U.S.C. §103(a)

Claims 10-15 and 17-18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, *et al.* in view of Larson '616, and Larson '415. It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

> To reject claims in an application under §103, an examiner must establish a *prima facie* case of obviousness. A *prima facie* case of obviousness is established by a showing of three basic criteria. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second there must be a reasonable expectation of success. Finally, ***the prior art reference (or references when combined) must teach or suggest all the claim limitations.*** *See* MPEP §706.02(j). *The* teaching or suggestion to make the claimed combination and the reasonable expectation of success must be found in the prior art and not based on the Applicant's disclosure. *See In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The claimed subject matter generally relates to a system that facilitates allowing a query optimizing component to infer a simple comparison on an indexed column from another predicate condition. This occurs by introducing into a query, extra predicates are used as dictated by rules that are received by the metadata component. To this end, independent claim 10 recites: ***analyzing the search results to output a best solution based at least on a determination that the implied predicate or the equivalent predicate is used in index-seek operation or covered by contents of one or more indices.*** The cited documents alone or in combination do not teach or suggest such claimed aspects.

As stated *supra*, Levy, *et al.* relates to a method for manipulating aggregation predicates in database applications but does not teach or suggest selecting predicates based on a determination of the predicates being used in an index seek operation or are covered by contents of one or more indices. Larson'616 relates to modifying or converting predicates involving a comparison with a string constant in a query so that the predicates can be evaluated by an external or remote source that uses a different collating sequence. But it does not makeup for the aforementioned deficiency of Levy, *et al.* The third reference Larson'415 selects subexpressions based on a view matching rule which determines from which materialized views, if any, the given expression can be computed. An index structure, called a filter tree, is provided that speeds up the search for applicable materialized views. For each such applicable materialized view it constructs a substitute expression that is guaranteed to produce the same results as the original expression (*See* Larson'415 col.3 lines 1-10). Hence, it is submitted that in accordance with

Larson'415 the best solution as determined by the system would require that In view of at least the foregoing, it is clear that none of the cited documents teach or suggest all aspects recited in the subject claims. Therefore, this rejection should be withdrawn with respect to claim 10 and all claims that depend there from.

IX. Rejection of Claims 16 and 20 Under 35 U.S.C. §103(a)

Claims 16 and 20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, *et al.,* Larson '616, and Larson '415, as applied to claim 10 above, and further in view of Reiner, *et al.* (U.S. 5,742,806). It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claims 16 and 20 depend from independent claim 10. As stated *supra*, Levy, *et al.* Larson'616 and Larson'415 do not teach or suggest all features of claim 10. Reiner, *et al.* relates to "query decomposition" wherein database queries are intercepted prior to processing by a database management system ("DBMS"). The system decomposes at least selected queries to generate multiple subqueries for application, in parallel, to the DBMS, in lieu of the intercepted query. Responses by the DBMS to the subqueries are assembled by the system to generate a final response (*See* Reiner, *et al.* Abstract). But it does not makeup for the aforementioned deficiency of Levy, *et al.* Larson '616, and Larson '415 with respect to independent claim 10. Therefore, withdrawal of this rejection is requested with respect to dependent claims 16 and 20.

X. Rejection of Claim 19 Under 35 U.S.C. §103(a)

Claim 19 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, *et al.,* Larson '616, and Larson '415, as applied to claim 10 above, in further view of Lin, *et al.* (US 6,675,159). It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claim 19 depends from independent claim 10. As stated *supra*, Levy, *et al.,* Larson'616 and Larson'415 do not teach or suggest all features of claim 10. Lin, *et al.* relates to indexing collections of documents with ontology-based predicate structures through automated or human-assisted methods. But it does not makeup for the aforementioned deficiency of Levy, *et al.*

Larson'616 and Larson'415 with respect to independent claim 10. Therefore, withdrawal of this rejection is requested with respect to dependent claim19.

XI. Rejection of Claims 21 and 31 Under 35 U.S.C. §103(a)

Claim 21 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, *et al.,* Larson '616, and Lin, *et al.* It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

> To reject claims in an application under §103, an examiner must establish a *prima facie* case of obviousness. A *prima facie* case of obviousness is established by a showing of three basic criteria. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second there must be a reasonable expectation of success. Finally, ***the prior art reference (or references when combined) must teach or suggest all the claim limitations.*** *See* MPEP §706.02(j). *The* teaching or suggestion to make the claimed combination and the reasonable expectation of success must be found in the prior art and not based on the Applicant's disclosure. *See In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The claimed subject matter generally relates to a system that facilitates allowing a query optimizing component to infer a simple comparison on an indexed column from another predicate condition. This occurs by introducing into a query, extra predicates are used as dictated by rules that are received by the metadata component. To this end independent claim 21 recites: ***either of the implied predicate or the equivalent predicate is selected from the one or more implied predicates based at least on a determination of the predicate being used in index-seek operation or covered by contents of the one or more indices.*** The cited documents alone or in combination do not teach or suggest such claimed aspects.

As stated *supra*, Levy, *et al.* relates to a method for manipulating aggregation predicates in database applications but does not teach or suggest selecting predicates based on a determination of the predicates being used in an index seek operation or are covered by contents of one or more indices. Larson'616 relates to modifying or converting predicates involving a

comparison with a string constant in a query so that the predicates can be evaluated by an external or remote source that uses a different collating sequence. But it does not makeup for the aforementioned deficiency of Levy, *et al.* with respect to independent claim 10. The third reference Larson'415 selects subexpressions based on a view matching rule which determines from which materialized views, if any, the given expression can be computed. An index structure, called a filter tree, is provided that speeds up the search for applicable materialized views. For each such applicable materialized view it constructs a substitute expression that is guaranteed to produce the same results as the original expression (*See* Larson'415 [0005]). Hence, it is submitted that in accordance with Larson'415 the index structures are used in searching for materialized views that generate the expressions. Moreover, Larson'415 teaches using subexpressions which can be computed from a single view alone (*See* Larson'415 [0020] lines 11-12 "*It is preferable that a substitute expression is computed from the view alone*"). This is unlike selecting predicates based at least on a determination of the predicate being used in index-seek operation or covered by contents of the one or more indices as recited in the independent claim 21.

In view of at least the foregoing, it is clear that none of the cited documents teach or suggest all aspects recited in the subject claims. Therefore, this rejection should be withdrawn with respect claim 21 and claim 31 that depends there from.

XII. Rejection of Claims 22-24, 28, 29, 34, 38 and 39 Under 35 U.S.C. §103(a)

Claims 22-24, 28, 29, 34, 38 and 39 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, *et al.*, Larson '616, and Lin, *et al.* as applied to claim 21 above, further in view of Larson '415. It is respectfully requested that this rejection be withdrawn for at least the following reasons. Claims 22-24, 28, and 29 depend from independent claim 21 while claims 38 and 39 depend from independent claim 34. None of the cited references alone or in combination teaches or suggests all aspects recited in the subject independent claims.

The claimed subject matter generally relates to a system that facilitates allowing a query optimizing component to infer a simple comparison on an indexed column from another predicate condition. This occurs by introducing into a query, extra predicates are used as dictated by rules that are received by the metadata component. To this end independent claims 21 and 34 recite similar features namely: ***means that analyzes the search results and outputs a***

best solution based at least on a determination that the implied predicate or the equivalent predicate is used in index-seek operation or covered by contents of the standard or multi-valued indices. As discussed *supra*, none of the cited references alone or in combination teach or suggest such claimed aspects. In view of at least the foregoing, withdrawal of this rejection is respectfully requested.

XIII. Rejection of Claims 25 and 26 Under 35 U.S.C. §103(a)

Claims 25 and 26 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, *et al.*, Larson '616, and Lin, *et al.* as applied to claim 21 above, further in view of Pauschine, *et al.* (U.S. 5,918,232). It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claims 25 and 26 depend from independent claim 21. As stated *supra*, Levy, *et al.,* Larson'616 and Lin, *et al.* do not teach or suggest all features of claim 21. Pauschine, *et al.* relates to a system and method for computer modeling and for creating hyperstructures which are obtain measurements of physical objects and activities related to an entity to be modeled. But it does not makeup for the aforementioned deficiency of Levy, *et al.* Larson'616 and Lin, *et al.* with respect to independent claim 21. Therefore, withdrawal of this rejection is requested with respect to dependent claims 25 and 26.

XIV. Rejection of Claims 27 and 30 Under 35 U.S.C. §103(a)

Claims 27 and 30 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, *et al.,* Larson'616 and Lin, *et al.* as applied to claim 21, and further in view of Paulley, *et al.* It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claims 27 and 30 depend from independent claim 21. As stated *supra*, Levy, *et al.,* Larson'616 and Lin, *et al.* do not teach or suggest all features of claim 21. Paulley, *et al.* relates to query optimization techniques that selectively normalize segments of a query based on a determination of whether it is advantageous to fully convert each given segment to conjunctive normal form(CNF) (*See* Paulley, *et al.* Abstract). But it does not makeup for the aforementioned

deficiency of Levy, *et al.,* Larson'616 and Lin, *et al.* with respect to independent claim 21. Therefore, withdrawal of this rejection is requested with respect to dependent claims 27 and 30.

XV. Rejection of Claim 32 Under 35 U.S.C. §103(a)

Claim 32 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, *et al.,* Larson'616 and Lin, *et al.* as applied to claim 21, and further in view of Reiner, *et al.* It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claim 32 depends from independent claim 21. Reiner, *et al.* relates to "query decomposition" wherein database queries are intercepted prior to processing by a database management system ("DBMS"). The system decomposes at least selected queries to generate multiple subqueries for application, in parallel, to the DBMS, in lieu of the intercepted query. Responses by the DBMS to the subqueries are assembled by the system to generate a final response (*See* Reiner, *et al.* Abstract). But it does not makeup for the aforementioned deficiency of Levy, *et al.,* Larson'616 and Lin, *et al.* with respect to independent claim 21. Therefore, withdrawal of this rejection is requested with respect to dependent claim 32.

XVI. Rejection of Claim 33 Under 35 U.S.C. §103(a)

Claim 33 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, *et al.,* Larson'616 and Lin, *et al.* as applied to claim 21, and further in view of Leslie, *et al.* (US 5,778,354). It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claim 33 depends from independent claim 21. Leslie, *et al.* relates to a database management system with a multi-dimensional indexed accessing capability using keyed index searching (*See* Leslie, *et al.* Abstract). But it does not makeup for the aforementioned deficiency of Levy, *et al.,* Larson'616 and Lin, *et al.* with respect to independent claim 21. Therefore, withdrawal of this rejection is requested with respect to dependent claim 33.

XVII. Rejection of Claims 35 and 36 Under 35 U.S.C. §103(a)

Claims 35 and 36 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, *et al.*, Larson '616, Lin, *et al.*, and Larson '415 as applied to claim 34 above, further in view of Pauschine, *et al.* It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claims 35 and 36 depend from independent claim 34. As stated *supra*, Levy, *et al.*, Larson '616, Lin, *et al.*, and Larson '415 do not teach or suggest all features of claim 34. Pauschine, *et al.* relates to a system and method for computer modeling and for creating hyperstructures which are obtain measurements of physical objects and activities related to an entity to be modeled. But it does not makeup for the aforementioned deficiency of Levy, *et al.*, Larson '616, Lin, *et al.*, and Larson '415 with respect to independent claim 34. Therefore, withdrawal of this rejection is requested with respect to dependent claims 35 and 36.

XVIII. Rejection of Claim 37 Under 35 U.S.C. §103(a)

Claim 37 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, in view of Levy, *et al.*, Larson '616, Lin, *et al.*, and Larson '415 as applied to claim 34 above, further in view of Paulley, *et al.* It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claim 37 depends from independent claim 34. As stated *supra*, Levy, *et al.*, Larson '616, Lin, *et al.*, and Larson '415 do not teach or suggest all features of claim 21. Paulley, *et al.* relates to query optimization techniques that selectively normalize segments of a query based on a determination of whether it is advantageous to fully convert each given segment to conjunctive normal form(CNF) (*See* Paulley, *et al.* Abstract). But it does not makeup for the aforementioned deficiency of Levy, *et al.,* Larson'616 and Lin, *et al.* with respect to independent claim 34. Therefore, withdrawal of this rejection is requested with respect to dependent claim 37.

XIX. Rejection of Claim 40 Under 35 U.S.C. §103(a)

Claim 40 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, *et al.*, Larson '616, Lin, *et al.*, and Larson '415 as applied to claim 34 above, further in view of Reiner, *et al.* It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claim 40 depends from independent claim 34. Reiner, *et al.* relates to "query decomposition" wherein database queries are intercepted prior to processing by a database management system ("DBMS"). The system decomposes at least selected queries to generate multiple subqueries for application, in parallel, to the DBMS, in lieu of the intercepted query. Responses by the DBMS to the subqueries are assembled by the system to generate a final response (*See* Reiner, *et al.* Abstract). But it does not makeup for the aforementioned deficiency of Levy, *et al.*, Larson '616, Lin, *et al.*, and Larson '415 with respect to independent claim 34. Therefore, withdrawal of this rejection is requested with respect to dependent claim 40.

CONCLUSION

The present application is believed to be in condition for allowance in view of the above comments and amendments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [MSFTP576US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,

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